ARTICLE II.

THOUGHTS RELATING TO THE PROGNOSIS AND TREATMENT OF DIPHTHERIA.

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THE occurrence of diphtheria in all sections of the country, and the heavy death-rate which attends it; its persistence as an endemic in certain localities, as New York, and its frequent epidemic outbreak in country villages and towns, over wide areas, have awakened unusual inquiry on the part of physicians in reference to its nature and proper treatment. And there is no disease which more urgently demands all the light which science and experience can bestow, for not only do physicians disagree in regard to the nature of diphtheria, and the mode of treating it, but they are more frequently deceived by the prognostic signs in diphtheria than in almost any other disease. This uncertainty of prognosis, of which even physicians of ample experience complain, is, no doubt, in great part due to the fact, that diphtheria terminates fatally in several distinct ways. Hence while the patient may be secure, as regards the more manifest and common conditions of danger, so as to justify a favourable prognosis in the opinion of the physician who attends him, the fatal result may suddenly occur from some unseen and unsuspected cause.

Death in diphtheria may result from—

1st. Diphtheritic blood-poisoning.

2d. Probably, also, from septic blood-poisoning produced by absorption from the under surface of the decomposing pseudo-membrane. But it is difficult to distinguish the constitutional effect of sepsis, from those produced by the diphtheritic poison. Septic poisoning is obviously most apt to occur in those cases in which the pseudo-membrane is extensive, and deeply imbedded, and its decomposition attended by an offensive effluvium. Cervical cellulitis, and adenitis, which when severe cause very considerable swelling of the neck, appear to be often, if not usually, due to septic absorption from the faucial surface, the inflammation extending from the absorbents to the glands and connective tissue. Considerable tumefaction of the neck therefore seldom occurs in diphtheria or scarlet fever, without manifest symptoms of toxæmia, and is to be regarded as a sign of its presence.

3d. Obstructive laryngitis.

4th. Uræmia.

5th. Sudden failure of the heart's action, either from the anæmia, and general feebleness, from granulo-fatty degeneration of the muscular fibres of the heart, which is liable to occur in all infectious diseases of a malignant type, or from ante-mortem heart clots.

6th. Suddenly developed passive congestion and œdema of the lungs, probably due to feebleness of the heart's action, or to paralysis of the respiratory muscles. I have known death to occur apparently from this cause during the period of supposed convalescence, and when the visits of the physician had been discontinued. Thus in a case in my practice, symptoms of œdema pulmonum (moist rales in both sides of the chest, and embarrassed breathing) suddenly occurred nearly one month after the disappearance of the faucial pseudo-membrane and inflammation. The urine, which had contained considerable albumen during the active period of the malady, had for some time shown no trace, or but slight trace of this principle by the proper tests. By active stimulation these symptoms entirely disappeared in a few hours, and the heart's action seemed normal, unless a little weakened. On the following day the same symptoms reappeared, and death occurred before I was able to reach the house.

That physician obviously is least apt to err in prognosis, who recognizes the fact that patients are liable to perish in any of these different ways, and carefully examines in reference to all the conditions which involve danger. Many physicians, as I have had the opportunity to observe, are remiss in not examining more frequently the urine of diphtheritic patients, for there is often a large amount of albumen in the urine in diphtheria, indicating a poisonous quantity of urea in the blood, and yet the appearance of the urine to the naked eye is probably normal.

Among the symptoms which render the prognosis unfavourable are, repugnance to food, vomiting, pallor of countenance, with progressive weakness and emaciation from the blood-poisoning; a large amount of albumen with casts in the urine, showing uræmia, to which the vomiting is sometimes, but not always, attributable; a free discharge from the nostrils, or occlusion of them by inflammatory thickening, and exudation, showing that a considerable portion of the Schneiderian membrane is involved, hemorrhage from the nostrils or fauces, and obstructed respiration. One, at least, of these symptoms has been present in most of the fatal cases which have fallen under my observation.

Treatment.—It is remarkable that there is so little agreement in the profession in regard to the medicinal treatment of diphtheria, since this disease has now been under almost constant observation during the last twenty years in the principal cities of this country, and many epidemics have been closely observed and reported by intelligent physicians in the rural districts. The wide discrepancy, which exists in reference to the proper therapeutic measures, receives partial explanation from the fact of a wide difference of opinion as to the nature of diphtheria and its mode of commencement, but is more due to the fact that statistics of its treatment afford very unreliable, and often conflicting data by which to determine the proper therapeutic measures. For scarcely any other disease presents such a diversity in type as diphtheria, from cases so mild, that nearly all recover, whatever the measures employed, to those so severe, that a large proportion die under the best possible treatment. And this difference in type may be observed in cases occurring at the same time in a great city like New York, or even in the cases, which two physicians, practising near each other, may be called upon to treat. Hence, one physician recommends with confidence a medicine or mode of treatment, as eminently successful in his hands, which another physician of equal experience speaks disparagingly of. The theory relating to diphtheria which, in my opinion, has of late years done the most harm, is that which attributes it to low vegetable organisms, visible under the microscope, which alight upon one of the exposed surfaces, usually the fauces, where they excite local inflammatory action, and if not promptly destroyed, are apt to penetrate the tissues, enter the blood, and establish a constitutional disease. Acceptance of this theory evidently led to the employment of parasiticide medicines, the so-called antiseptics, or anti-ferments, externally and internally, to arrest and destroy the vegetable growth, their local use sufficing, according to the theory, in the early stage, when these organisms had passed no farther than the surface, but their internal use being required in addition, if the malady had continued longer, and the disease had become general. Hence, in proportion as this doctrine came in vogue, carbolic acid, chlorine preparations, bromine, the sulphites, phenic acid, and, as the best representative of this class of medicines, and most powerful antiseptic, salicylic acid, attained at once prominence as the agents which would be most likely to cure diphtheria, by destroying the cause. A solution of bromine and bromide of potassium, having been used, with apparent good results, in the antiseptic surgery of the army during the late war, obtained under the influence of this theory some reputation in New York as a remedy for diphtheria employed externally and internally, and without the aid of other therapeutic agents. A certain number of drops are administered internally every hour, or second hour, properly diluted, and the same medicine undiluted, or with less dilution, is applied to the fauces with a brush at regular intervals.

But experience, if sufficiently extensive, is the safe guide in therapeutics, and, according to my observations, internal antiseptic measures have not seemed to exert any marked controlling effect on the course of diphtheria.

The following case may be cited as a common example. It shows how little salicylic acid, even aided by quinia and iron, controls the diphtheritic poison.

On May 6th, 1876, during my term of service in the New York Foundling Asylum, a boy aged 4 years took diphtheria. His temperature on the first day was 103°, and a pseudo-membrane had already appeared on each tonsil at the time of my first visit. A mixture of tinc. ferri chloridi with potas. chlorat. was given to him on the first hour, two grains of sulphate of quinia on the second hour, and three grains of salicylic acid, rendered soluble by borax, on the third hour. These medicines were thus administered night and day in alternation, while at regular intervals an antiseptic application was made to the fauces. The following is the subsequent history of this case, in which sixteen grains of quinia and twenty-four grains of salicylic acid were administered daily besides the potash and iron, with nutritious diet, and a moderate amount of alcoholic stimulants. 7th. Pulse 120, temp. 100°. 8th. Pulse and temperature same as yesterday; he has no cough and no discharge from the nostrils. 9th. Pulse 124, temp. 99½° ; had this morning epistaxis; the pseudo-membrane covers the tonsils and extends a little upon the palate; no deposit of urates, no apparent excess of urea, no albumen in the urine; its specific gravity 121. 10th. Breathes heavily when asleep, from the swollen state of the fauces; pulse 140, temp. 100; had epistaxis once since yesterday; the urine contains a moderate amount of albumen, with hyaline casts, and sp. gr. 1018; no urea deposited by the nitric acid test.[1] On subsequent days the urine gradually became more scanty and albuminous, and the casts increased. On the 13th it is stated that not more than one ounce of urine had been passed in twelve hours. Vomiting with epistaxis occurred, the pulse fell to 96, the countenance presented an ashy pallor, and death occurred on the 14th.

At the autopsy several, probably a dozen, patches of extravasated blood were observed under the skin; there were numerous extravasations of blood in the internal organs, particularly in the lungs, and under the mucous surface of the stomach. There was uniform injection of the mucous membrane of the air passages. The heart seemed normal; the kidneys were removed for microscopic examination.

This case, which presented the ordinary history of fatal diphtheria, did not seem to be materially modified by the internal antiseptic treatment. It would apparently have done as well without it. It is but one case, though an average example, and I have not observed any other case in which the internal use of antiseptics seemed to produce a curative effect. My knowledge, however, of the bromine treatment is limited to the four children of one family, and to the effects of its use, which have been reported to me by others.

The theory that micrococci, or vegetable monads, are the specific principle of diphtheria, which suggests and justifies the antiseptic treatment, was promulgated to the profession by comparatively young men, who had seen less of diphtheria than many others, but had zealously used the microscope. Their opinion, based on microscopic examinations and experiments, plausible, because having the appearance of scientific exactness, was widely received. And since, according to this theory, diphtheria is at first localized at the point upon the surface, where the micrococci are received, this opinion, so far as it was accepted, evidently led to the early energetic treatment of the local ailment, and indifference as regards constitutional measures. It is interesting to observe how the profession have been led by theories to regard the local treatment of diphtheria as of prime importance, especially during the first stage of the malady. Twenty to thirty years ago, when Trousseau was making his observations on diphtheria, and his views had great weight with the profession in both continents, it was believed that those blood diseases, which were communicated by inoculation, were at first local, even after the specific inflammation had appeared at the point of inoculation. Syphilis, for example, could be cured, it was thought, by proper applications to the specific eruption, if made within a certain number of days, and before the poison had entered the blood. In the same way it was believed that diphtheria is commonly received by inoculation, as it confessedly sometimes is, and could be cured by early-applied local measures. Hence Trousseau recommended to attack the pseudo-membrane, with what he designates " savage energy." After a time it began to be believed that the acute infectious diseases are already constitutional, although contracted by inoculation, when the specific eruption or lesion has appeared upon the surface, and that therefore no local treatment can prevent blood contamination, since it is already present. Now when this opinion was received generally by the profession, and diphtheria began 'to be regarded as a constitutional malady in its inception, as much as scarlet fever or measles, the promulgation of the bacterian theory exerted a retrograde influence, so that it seemed for a time, as if the old mode of treatment of the age of Bretonneau and Trousseau, would be restored. At this time there appeared in our language the ponderous volumes of Ziemssen's Encyclopedia, containing the cream of German medical literature, and as German physicists are most patient and exhaustive investigators, these volumes occupied the centres of our private libraries, and were pointed out as the means, which would be likely to elevate the profession of this country to a higher standard of medical knowledge. The treatise on diphtheria contained in this encyclopedia, the longest and most minute of any in the English language, was eagerly sought for and read, and an immense amount of harm done. The writer of this treatise is fully committed to the bacterian theory, and the section relating to treatment begins thus: " In diphtheria we have to deal at first with an infection, which is localized, and afterwards with a general disease resulting from this, out of which may ultimately be developed still a later affection of various organs," and he discusses first the local treatment, as of paramount importance, and secondly, the general treatment. It was a great misfortune, that a treatise like that by Sanné had not appeared in place of the one published. But the mischief was done, the brush and inhalations were made the potent instrument of cure, and constitutional remedies held the second place, and were believed to be unnecessary, except when local treatment had failed to destroy the micrococci, and the second stage, or that of general infection had arrived. For a time this theory has had its influence on practice, but unpleasant experiences have taught, and are teaching physicians, that local measures, however early and perseveringly employed, do not protect the system from the diphtheritic poison, do not prevent the occurrence of unmistakable symptoms of general infection in all cases of a grave type. Whatever the theory, experience gradually establishes the fact, in the minds of all observing physicians, that constitutional treatment is of paramount importance in diphtheria, as it is in that other malady, which, in my opinion, is most nearly akin to it, namely, scarlet fever, except when the danger is located in the larynx.

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[1] An equal quantity of strong nitric acid, and urine mixed in test-tube and allowed to stand twenty-four hours.

Since December, 1875, I have examined minutely, and preserved records of, 104 cases of primary diphtheria, occurring either in my private practice, or seen by me in consultation, besides observing cases, and witnessing autopsies in the New York Foundling Asylum, where diphtheria was endemic nearly two years. From these observations, as well as from what I have been able to learn from other physicians, I am persuaded that, in order to secure the best treatment, constitutional and local, of diphtheria, it is necessary that the physician should accept the following propositions :—

1st. The specific principle of diphtheria, in all probability, enters the blood, in ordinary cases, through the lungs ; and after an incubative period, which varies from a few hours to seven or eight days, produces the symptoms which characterize the disease.

2d. Facts do not justify the belief that the system can be protected by antiseptic or preservative medicines administered internally. A quantity of this kind of medicine, introduced into the system, sufficient to preserve the blood and tissues from the action of the diphtheritic virus, would, there is every reason to think, be so large as to arrest molecular action, and therefore the functions of organs, and occasion death.

3d. There is no known antidote for diphtheria, in the sense in which quinia is an antidote for malarial diseases, and no more probability that such an antidote will be discovered than for scarlet fever or typhoid fever.

4th. Diphtheria, like erysipelas, has no fixed duration. It may cease in two or three days, or continue as many weeks ; but the specific poison acts with more intensity in the commencement than subsequently, and its energy gradually abates. Hence, a diphtheritic inflammation, which arises in the beginning of diphtheria, as laryngitis, is more severe and dangerous than when the malady has continued a few days.

5th. The indication of treatment is to sustain the patient by the most nutritious diet, by tonics, and stimulants ; and to employ other measures, general and local, as adjuvants, to meet special indications which may arise. The rules of treatment appropriate for scarlet fever, apply for the most part to diphtheria. Local treatment of the inflammations should be unirritating, and designed to prevent putrefactive changes, and septic poisoning. Irritating applications which produce pain lasting more than a few minutes, or which increase the area or degree of redness, are apt to do harm, and increase the extent and thickness of the pseudo-membrane.

General Treatment.—This may be conveniently considered under the three heads, food, stimulants, and tonics. All physicians of experience recognize the importance of the use of the most nutritious and easily digested food, and the preservation of the appetite—for the safety of the patient requires that he should retain, as far as possible, his flesh and strength. The more nutritious and easily digested the food, given in sufficient quantity, with the appetite preserved, the less, obviously, the danger of the fatal prostration, which so frequently occurs suddenly and unexpectedly in grave cases. Beef-tea, or the expressed juice of meat, milk with farinaceous food, etc., should be administered every two or three hours, or to the full extent, without overtaxing digestion. Failure of the appetite, and refusal to take food, are justly regarded as very unfavourable signs. One objection to the use of the brush, instead of spraying the fauces, with the atomizer, is that it is more apt to provoke vomiting, by which nutriment, that is so much required, is lost. In malignant cases of diphtheria, as in scarlet fever of a similar type, patients are sometimes allowed to slumber too long without nutriment. It is the slumber of toxæmia, and should be interrupted at stated times, in order to give the food.

Stimulants.—M. Sanné, in his elaborate treatise on diphtheria, says: "De tous les antiseptiques donnes à l'interieur, l'alcool est de beaucoup le plus sûr. Plus l'infection est prononcée, plus il faut insister sur les composés alcooliques." He states that Bricheteau reports the history of a patient, who took daily, during the diphtheria, a bottle and a half of the wine of Bordeaux, without the least symptom of intoxication or headache. A somewhat similar case was reported to me, in which nearly a bottle of brandy was given in less than twenty-four hours, without any ill effect, and an apparent good result on the general course of the disease. The same rule holds true in diphtheria as in other acute infectious maladies, that while mild cases do well without alcoholic stimulants, they are required in all cases of a severe type, and should be administered in large and frequent doses, whenever pallor and loss of appetite, or of strength and flesh, indicate danger from the diphtheritic or septic infection. It matters little how the stimulant is administered, whether milk-punch or wine-whey, provided that the proper quantity is employed. Were I to accept the theory that the cause of diphtheria is a vegetable organism, and were to search for a medicinal agent, employed internally, which would be most likely to destroy it, or retard its reproduction and development, I should accept the opinion of Sanné that the alcoholic preparations more nearly fulfil the indication, than any other agent.

Of the vegetable tonics, cinchona, or its important alkaloid principle, quinia, is more commonly employed than any other medicine, and there is probably none which answers the purpose better. The compound tincture of cinchona, and the fluid extract, have been used and recommended by physicians of experience; but quinia is more commonly employed, and is regarded by a large proportion of physicians as the most useful of all therapeutic agents in the treatment of this malady. But there is great difference of opinion in regard to the quantity which is required each day, or the size and frequency of the doses. It is sometimes administered in small doses, as one grain every three or four hours, for its supposed tonic effect; and again in doses sufficiently large to produce an antipyretic effect, as from twenty to forty grains per day. It is prescribed by some physicians in two or three large doses per diem, as ten or fifteen grains, and by others in small and frequent doses. That quinia does not exert any special or peculiar action in diphtheria, and is beneficial in the same way, and no farther than in other acute infectious diseases, is, I think, generally admitted by the profession; for large doses do not exert that controlling effect, which we would expect from a specific, as is shown by cases like the following, which are not infrequent, during severe epidemics:—

C——, aged four years, male, was examined by me in consultation, on February 10th, 1876. I learned that he had apparently contracted diphtheria from the escape of sewer-gas through a defective trap in the little room where he slept, and that the disease began after midday on February 6th, with fever. At 10 P. M. of the same day, when visited by the family physician, the temperature was 103°, and the fauces were red, but without any pseudo-membrane. Four grains of quinia were ordered to be given every two hours, and ten drops of the tincture of the chloride of iron, with two grains of the chlorate of potassa, to be given three times hourly. On the 7th the exudation covered both tonsils and the half arches; temperature 102½°; evening, temperature 100°; pulse 128. 8th. Is playful; pulse 100; has slight swelling of the cervical glands; evening, some extension upward of the pseudo-membrane; has vomiting. 9th. Pulse 144; vomits often. 10th. At 3 P. M. began to grow worse; pharynx and nostrils covered with the exudation.

It was impossible, at the time of my visit, to obtain any of the patient's urine for examination, and death occurred a few hours afterwards from the toxæmia. Forty-eight grains of quinia daily, administered from the first day, had no appreciable effect in staying the fatal progress of the malady, had no such effect as would be likely to follow, were its action specific or antidotal. But there are two advantages from the quinia treatment, which explain the confidence reposed in it by the profession: 1st. It has an antipyretic effect in doses of from three to five, or more, grains. 2d. In moderate doses it is one of the most reliable tonics. But high febrile movement, requiring an antipyretic, I have seldom observed in diphtheria, except in the first forty-eight hours; and if, during this time, the febrile movement be such that an antipyretic is required, quinia in the larger doses is preferable, in my opinion, to any other remedy. In its subsequent use, namely, as a tonic, two grains may be administered every two to four hours. But other bitter mixtures, which have been found to be the most useful tonics in general practice, perhaps would meet the indication nearly or quite as well.

There is the same difference of opinion in regard to the use of iron, as to the use of quinia. Some prescribe the tincture of the chloride of iron, as the sole remedy in large and frequent doses, and others in smaller doses, as an adjuvant to the vegetable tonic.

The internal treatment which I have found most satisfactory for a child of five years is the following:—

℞. Quiniæ sulphat. ʒss; elix. adjuvantis (Caswell and Hazard's), vel elix. tarax. comp. ℥ij. Misce. Give one teaspoonful every two to four hours; and hourly, between, one teaspoonful of the following:—

℞. Tinc. ferri chloridi, ʒij; potas. chlorat. ʒij; syr. simpl. ℥iv. Misce.

The tonic effect of the iron is not impaired by the chlorate of potassa, which is added to the mixture, on account of its local action on the inflamed surface.

The citrate of iron and ammonia alone, or in combination with carbonate of ammonia, may be given in two grain doses, dissolved in simple syrup, in place of the above mixture, when the inflammation of the fauces has considerably abated or is moderate. If the patient improve, and the disease begins to abate, the intervals between the doses may be lengthened, but the tonics should not be entirely discontinued, until the patient is far advanced in recovery, on account of the dangerous sequelæ, which take their origin in an impoverished state of the blood.

Local Treatment.—It is important to keep in mind the purpose for which local measures should be employed, as stated above. It is to reduce the inflammation of the mucous surfaces, and destroy the diphtheritic poison, and contagious properties in the pseudo-membrane, and to destroy the septic poison, and prevent its absorption, if any forms. Forcible removal of the pseudo-membrane, irritating applications, the use of a sponge or other rough instrument, for making the applications, should be avoided as likely to do harm. The applications should be made either with a large camel's hair pencil, or, better for most of the mixtures employed, with the atomizer. The hand atomizer, like Delano's, which is cheap and of simple construction, while it carries a heavy spray from the curved tube, which is introduced over the tongue, is very useful, but the constant spray of the steam atomizer is more effectual, and is preferable in severe cases.

The following mixtures I am in the habit of using with the atomizer:—

1. ℞. Acid. salicylic. ʒss; glycerinæ, ℥ij; aq. calcis, ℥viij. Misce.
2. Acid. carbolic. gtt. xxxij; glycerinæ, ℥ij; aq. calcis, ℥vj. Misce.
3. Acid. carbolic. gtt. xxxij; potas. chlorat. ʒiij; glycerinæ, ℥iij; aquæ, ℥v. Misce.

Half a dozen to a dozen compressions of the bulb of the hand atomizer cover the surface of the throat more effectually with the liquid than can be done by several applications of the brush, and it is usually not dreaded by the patient. Diminution of size of the pseudo-membrane under the use of the spray is a favourable sign, but if it do not diminish, its presence can do little harm, provided that it is properly disinfected.

In many cases of diphtheritic inflammation of the fauces the spray suffices for local treatment, but the following mixture, applied by a large camel's hair pencil, is also very effectual, immediately converting the pseudo-membrane into an inert mass, and putting a stop to all movements of the bacteria which swarm in it, as I have observed under the microscope:—

℞. Acid. carbolic. gtt. viij; liq. ferri subsulphat. ʒij–iij; glycerinæ, ℥j. Misce.

This may be used two or three times daily, between the spraying, or oftener without the spraying. It is not irritating (such an effect would condemn it), but it is dreaded by most children, on account of the unpleasant "puckering," which it produces.

That form of diphtheritic inflammation which most imperatively requires local treatment, and in which local measures are of more importance than the constitutional, is obviously the laryngitis. Catarrhal laryngitis sometimes occurs in diphtheria, as I have had the opportunity to observe in the dead-house, without producing any marked symptoms, but the pseudo-membranous laryngitis of diphtheria is also common, and, as all know, is one of the most dangerous forms of disease.

Of the 104 cases of primary diphtheria, which I have alluded to above, as having been seen by me in family practice, since December 1, 1875, and notes of which I have preserved, in twenty-five the predominant inflammation was pseudo-membranous laryngitis. Cases in which there was some huskiness or hoarseness of voice, but no obstruction in the respiration, were not included in this number. Of these twenty-five cases, in which there seemed to be no reasonable doubt of the presence of a laryngeal pseudo-membrane, nine recovered, two by tracheotomy, and seven by the inhalation of the spray. Of the sixteen who died, upon two tracheotomy was performed, while the others were treated by the spray. It will be admitted, I think, that recovery of nine in twenty-five cases was an exceptionally good result, and was probably in part due to mildness in the type of diphtheria, during a portion of the time, in which these cases occurred, for if the type is severe the exudation is more abundant, and the exudative process continues longer. But those who observe carefully the effects of the spray (lime-water being used in the atomizer, as the most powerful solvent which can be safely employed), must admit that it is the most effectual agent at our command, for treating this very fatal affection. The following cases may be cited as examples, showing what may be accomplished by the spray:—

L., æt. 9 months, began to have croupy cough on February 16th, 1877, but it was slight at first and attracted little attention. Gradually this symptom became worse, and on the 19th I was asked to see her. At this time both inspiration and expiration were noisy, the cough frequent and croupy, the temperature 101°, and the fauces red, but without any pseudo-membrane upon them. In addition to the internal treatment, the above No. 2 mixture was ordered to be used every half hour to every hour. On the 22d small patches of pseudo-membrane were observed upon the fauces, the noisy respiration and croupy cough remained with little change, and the same treatment was continued.

24th. Symptoms worse; temperature 103°; respiration still more embarrassed, and the sternum is depressed in each respiration. Evening, temperature 101°; respiration 40; pulse 136; urine scanty, none of which can be collected for examination. The steam atomizer is to-day substituted for the hand atomizer, and its constant use directed.

25th. No lividity of fingers or lips, but very great dyspnœa; struggles for breath at times, with a wild expression of the eyes; respiration 40; pulse 164; temperature 103°. On the evening of this day, it did seem that the child would die before morning, and I greatly regretted that tracheotomy had not been performed, and would then have prepared for it, except for the opposition of the family. The No. 1 mixture was now substituted for the No. 2, and used without intermission.

26th. Respiration 48, its character as before, but the mother states that the cough is somewhat looser; temperature 103½°. The membranous exudation has disappeared from the fauces. From this time there was gradual improvement, and in a few days the child was out of danger.

In the same month in which the above case occurred, diphtheritic laryngitis appeared in two other families in my practice, and the following histories of them will also show the probable good effects of the atomizer:—

B., æt. 13 months, began to be croupy on February 14. On the 16th, when visited by me, there were small isolated patches of pseudo-membrane upon the fauces, and the uvula was completely covered by this exudation. The cough was croupy, but the respiration was much easier than in the above case, and there was much less hoarseness of voice. The No. 2 mixture was used every half hour with Delano's hand atomizer, and the symptoms, which never showed any immediate danger, gradually abated.

B., a girl, æt. 4 years, living in the east side of the city, began to be hoarse on February 14, and on the 15th the dyspnœa became so urgent, that the attending physician performed tracheotomy. A cast two inches in length, circular, and evidently extending nearly to the bifurcation, was expectorated from the opening, after which the respiration was easier. Her temperature was constantly under 100°. A few days after the operation, symptoms of profound blood poisoning occurred. The urine was very albuminous, and it contained casts. The edges of the opening into the trachea became covered with the diphtheritic pellicle, and the characteristic offensive odour was observed. Her death occurred on February 22.

The second child, æt. 20 months, began to be hoarse on February 15. It was visited by myself with the attending physician on the 17th. Her temperature was 101°; her fauces were red, but with only small patches of exudation, and her respiration was embarrassed and noisy, so as to be heard in the adjoining room. We prescribed, in addition to sustaining remedies, the constant use of the No. 1 mixture through the steam atomizer. Some of the time two steam atomizers threw the spray upon the face of the child. It was obvious within a day or two, that the obstruction within the larynx had not increased, and with the constant use of the instruments night and day the inflammation gradually abated, and the life of the child was saved.

These cases indicate, in my opinion, the proper course of treatment in diphtheritic laryngitis, but while we accord to local measures the first place in the role of therapeutic agents for this form of inflammation, internal treatment should not, as a rule, be suspended. Even mild cases of diphtheritic laryngitis may end fatally by systemic infection after the obstruction in the larynx is removed as in the above case, in which tracheotomy was performed, although the temperature during the period of the dyspnœa had been constantly under 100°.

Unless in comparatively rare instances, there is only one other diphtheritic inflammation which requires especial treatment, namely, that affecting the Schneiderian membrane. This membrane, in sensitiveness and liability to irritation, is intermediate between the conjunctiva and buccal or faucial membrane, and, therefore, when inflamed it requires milder applications than such as are appropriate for the fauces. Applications suitable for the fauces, would, if thrown into the nostrils, be too painful, and might increase the inflammation. I know no better treatment of the nostrils, than to inject with a small syringe one to two teaspoonfuls of the following mixture every third or fourth hour. It should be used at the temperature of the body, with the head thrown back and the eyes covered with a cloth: Acid. carbolic. gtt. xxiv; glycerinæ, ℥ij; aquæ, ℥vj.

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ARTICLE III.

RETINITIS APOPLECTICA AND EMBOLIC INFLAMMATIONS OF THE RETINA.

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THAT extravasation of blood should sometimes take place in the retina is not surprising in view of the delicacy of the memberane. Observation has shown that a variety of changes may occur in its vessels to favour their rupture. For instance, Pagenstecher (*Archiv für Ophthalmologie*, B. xvii., Abth. 2, S. 98, 1871) gives a figure of a network of capillaries, with irregular enlargements and projections, which belonged to a case of hemorrhagic glaucoma. Wedl, in his Pathological Anatomy of the Eye, depicts calcareous degeneration of the capillaries. Several writers have described aneurismal dilatations of the retinal vessels seen by the ophthalmoscope. (See Martin and Galezowsky.) Fatty degeneration of the vessels is a common occurrence in albuminuric retinitis. (See Nagel, Virchow.) With such organic alterations the friable vessels may burst under no more than the normal blood pressure.